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SUBJECT IV

**ODISHA' S TRYST WITH MILLETS AND INTEGRATED FARMING:
INCLUSIVE, SUSTAINABLE AND GOING GLOBAL**

**Millet-based Enterprises and Sustainability: Evidences from
Farmer Producers Company in Kalahandi District, Odisha[†]**

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Parul Jain and Pradeep Kumar Sahoo***

ABSTRACT

The importance of millet in the present ecosystem as a mitigating tool towards planet, people and business is realised across all stakeholders in the agriculture and agribusiness system. Farmer Producers Companies are the new economic enterprises evolved to strengthen the collective efforts of marginal and small farmers. Sustainability is an important pillar in the integration and transformation of millet based enterprises to a sustainable business unit among the farmers group in the farmer producers company. Considering the emerging importance of millets to the present climate stress situation and evolution of Farmer Producers Company, the present study was conducted in the western undulating zone of Odisha state, i.e., Kalahandi. The study is based on survey data brought out of a structured interview schedule. A total of 312 sample households were interviewed among four FPCs in different blocks of the district. Following two important research questions were raised to qualify the subject of the study: What are the factors responsible to undertake millet based enterprises among the farmers within the context of the study? What are the important sustainability factors that determine an impact on farmer income? The study found that value addition and innovations are the important sustainability factors that create an impact on farmer income. Collaboration was also found significant but not to the extent. Further age, marital status, family support, financial stability, scale of operations were the internal factors and policy governance and public relations as external factors that drives farmers' decision to undertake millet based enterprises among the FPCs. The Odisha Millet Mission initiative has set to be a driving force across the production and post-production activities to strengthen and enhance the eco-environmental sustainability.

Key words: Millet based enterprise, Farmer Producers Company, Sustainability

JEL: O10, Q13, Q56

I

INTRODUCTION

Increasing incidence of climate change issues are faced by all sections of the community. But during the past few decades, the effect has been felt by the farming community. Exclusively, the climate stress conditions, low rainfall resulting in food

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The views in the article are of the authors alone and for academic research and do not reflect the views of UNDP, Aga Khan Foundation, MoA&FW.

[†]The data used for this study is a part of our previous research work on agri-enterprise and sustainability, which results have not been published elsewhere.

losses and leading to food and nutritional insecurity. In the large rainfed areas of India, where 86.4 per cent of the farmers are marginal and small is in a higher need of climate resilient adaptive measures.

In India, stunted growth in children under the age of five, i.e., 38 per cent and anaemia among the reproductive age group, i.e., 51 per cent is highly prevalent. Obesity is also in an increasing trend in rural and urban areas leading to diabetic and other diseases. Over the period, the breaking down of local, indigenous and regional dietary food system has led to fast decline in the diversity of food production. As India continues to suffer from a vicious cycle of poor intake of nutrients, poor diversity in diet (NHFS-5); the prevalence of people suffering from anaemia and micronutrient deficiencies continues to rise. This is evident from all recently released National Family Health Survey, Fifth Round (NHFS-5), with 57 per cent of all women in reproductive age group, (an increase of 4.1 percentage point over NHFS-4) and 67.1 per cent of all young children (an increase of 2.3 percentage point over NHFS-4). A comprehensive examination of the societal factors influencing anaemia and micronutrient deficiencies indicates that anaemia prevalence remains consistent across all income quintiles and geographical regions, encompassing both rural and urban areas. However, the lowest income quintiles experience the most severe impact.

Millets are highly nutritious food has taken a back seat in the Indian food production as well as consumption landscape due to agricultural policies and poor value chain mechanism. Millets are of better nutrition with various micro nutrients and low glycemic index as compared to mainstream cereals like rice, wheat and maize. Besides the nutritious properties, millets are climate resilient crop, having the ability to adapt a wider range of climatic stress, with stand the climatic situations, requires low water and nutrients to grow. Despite the advantages, the amount of land under agriculture has declined from 7.26 million hectares in 1965–1966 to 1.98 million hectares in 2020–21.

Farmer institution such as Farmer Producers Company evolved as an alternative for increasing market participation and reducing transaction costs through collective effort. Evidently agricultural value chains are highly disrupted and the extents of involvement of intermediaries are high, result a low share for producers in consumer price. Further, the quality and quantity loss make a limited scope for value addition and higher price realisation. Producers companies are farming enterprises which incubate the marginal and small farmers through collective effort in achieving better economies of scale.

Both central and state government through various programmes and schemes are promoting and mainstreaming millets in to primary diet and include under Public Distribution System, Integrated Child Development Scheme, and Mid-day meal scheme. Considerably recognised with their unique potential, the Food and Agriculture Organisation of the United Nations has announced the year 2023 as the 'International Year of Millets'. Among the total millets production in India, bajra

constitute 60 per cent, 27 per cent of jowar, 11 per cent ragi and 2 per cent small millets. Odisha being prone to disaster and hazardous condition where 54 per cent of the land is under rainfed requires an alternative and sustainable mechanism to climate change. Millets being a resilient crop to climatic adversities can be retained through various integrated approaches and enterprise development as like currently highly priorities under the Odisha Millet Mission.

Understanding the potential and need of the ecosystem, the study delves to answer the following research questions through quantitative research in rainfed context, i.e., Kalahandi district of Odisha: (1) what are the factors responsible to undertake millet based enterprises among the farmers within the context of the study? (2) what are the important sustainability factors that determine an impact on farmer income?

II

OBJECTIVES OF THE STUDY

The objectives are as follows: (1) To determine the important sustainability factors that creates an impact on the farmers' income and (2) To ascertain the important factors responsible to undertake millet based enterprises among the farmers within the farmer producers company.

III

LITERATURE REVIEW

Entrepreneurship in agriculture is not just an activity to undertake to earn profit but it is also an opportunity for holistic development of the society in terms of awareness, profitability, productivity enhancement, creating a value chain of backward and forward Integration. Agriculture enterprise is a comprehensive strategy that emphasizes on the connection between knowledge and the market structure. Sudharani (2012) defines Agripreneurship as generally sustainable, community oriented and directly marketed agriculture. In this entrepreneurial process an entrepreneur takes risk and maintains balance to tap new market opportunity, so as to connect the producers to the market. Agripreneurs embrace innovative techniques, approaches, processes for connecting to the beneficiaries and getting economic benefits.

Dollinger (2003) defined an agricultural enterprise as the development of an innovative economic organization with the aim of growth or gain in the face of risk and uncertainty in agriculture. It is important to note that the expansion of free market economies around the world has led to the birth of a new entrepreneurial spirit and an increased demand for people to take personal responsibility for managing their own enterprises(Alex, 2011).

Producer Company as an enterprise aimed at improving the collective strength and getting remunerative price for their produce. But study Jena (2022) in Cuttack district of Odisha among 131 households reveals that their inadequate knowledge

base of resource institutions led them to function in the traditional way of conducting business operations. The marketing constraint with exploitation of middle men and distress sale are the major challenges they face.

Adopting the theory of “Economies of Scale” sustainability and marginal and small farmers (Nayak, 2017) coined that “economies of scope” benefits agricultural household and farmer institutions not only in terms of food production that is nutritious and climate resilient, but also agricultural ecosystem sustainability.

Anirban *et al.* (2018) in their review work on the status and roadmap of farmer producer companies in India proposed that besides welfare and business outlook the conditions of sustainability cannot be ignored. Henceforth, sustainability is important across the institutions and farmers households (Pani and Satapathy, 2022). Women play a crucial role in agriculture but they earn less benefit. The participation of women in Farmer producer Organisation in Karnataka remains relatively low despite a spurt in the formation and registration (Gowda and Dixit, 2018). The study proposed the need of gender sensitive initiatives to encourage women farmers to get the benefit of value chain. Kumar *et al.* (2019) argue that Farmer Producer Organisations (FPOs) or Farmer Producer Companies (FPCs) have emerged as a highly effective means to address numerous obstacles in the agricultural sector. Hence, the technical guidance, model plan and feasible business proportions (Pani *et al.*, 2022) needs to be channelised in an appropriate way to deliver effectively.

Similarly Parida *et al.* (2021) raised few pertinent questions in their review work on FPC related to strategic challenges and new dimensional opportunity. Studies made by few researchers (Govil *et al.*, 2020; Itigi *et al.*, 2012; Shrivastava *et al.*, 2022) have pointed out the challenges faced by the producer organisation but have not critically analysed “why do the producers organization face challenges?” Prasad (2021) reflected in his study on FPO ecosystem in India that the need of the private players for an improved performance and long term sustainability.

Vignesh (2019) through their study on the role of actors in farmer producer organisation based millet value chain reveal that the extent of participation of farmers in the value addition is negligible. Further erratic rainfall and poor quality seeds were the major constraints. Adekunle *et al.* (2018) conceptualises an innovation driven business model to stimulate the agribusiness growth of millets along with stakeholder involvement. Das (2020) in her study on Odisha reflected that the causes of disruption of the supply chain of millets irrespective of the presence of Odisha Millet Mission. The primary constraints were attributed to the non-availability of robust financial support and a well-developed logistics and transportation infrastructure.

Evidently the existing body of knowledge have contributed much towards the agri-entrepreneurial traits, role of producers’ company in strengthening the rural agribusiness and disruptions in value chain of millets. But, much remains to be explored through quantitative research and methodological intervention. After reviewing the existing body of knowledge, it was found that the sustainability factors

have not been much explored. Hence, the present study has attempted to determine the important factors that create an impact on farmers' income.

IV

DATA AND METHODS

Study Area

Considering that agriculture is the livelihood of over 60 per cent of the population, it serves as a crucial driver of economic development in Odisha. The state's agricultural landscape is characterised by a diverse mix of agricultural, horticultural, and marine production, spanning across 61.80 lakhs hectares of cultivable land and encompassing ten distinct agro-climatic zones. Approximately 54 per cent of this cultivable land is equipped with irrigation facilities.

The state is witnessing a decline in area under cultivation where average size of land holding is declining by 1.04 ha. Attributing to the rich features of the state agriculture with increasing production level of the cultivated crop, the benefit of large scale production is not realised in terms of value, owing to several factors.

Predominance of small and marginal farmers who operate 74.92 per cent of the state land could not be able to reap the benefit. Agri-Vikas (2018) Unleashing agri and allied entrepreneurship in new Odisha, reveals that enhancement of farmers' income can be possible through four pillars, viz., market expansion and access, reducing produce wastage, promoting value addition and processing and by enabling skilling and entrepreneurship.

Odisha Tryst with Millets and Unleashing the Potential

Understanding the significance of millets in the context of Odisha to empower marginal and small farmers and to develop a mechanism towards climate uncertainties, crop diversification, nutritional efficiency and enhancing the income, the Odisha Millet Mission was initiated in 2017. It is a collaborative approach between the state government, academia and research and civil society where the project focus with an integrated approach towards strengthening production, processing and value addition, consumption, marketing and inclusion of millets in government scheme. The initiative has been presently scaled up to 30 districts covering about 2.02 lakhs farmers (OMM, 2023). The entire initiative is implemented by the FPOs/FPCs and NGOs as supporting organisation. Finger millets, foxtail millets, kodo millets are the major millets grown and scaled up in Odisha. Millets are being cultivated in about 54495.83 ha with finger millets occupying 86 per cent of the area.

Focusing the data with respect to the districts with better performing millet based enterprises (aggregation, processing, value addition, and effective mobilization of resources) and *district* challenged with hazardous climatic condition (low and

erratic rainfall, drought situation) Kalahandi district was found to be appropriate for the study. Kalahandi an agrarian economy is located in south western part of Odisha with a cultivated area of 378 ('000 ha). The study area is characterised by undulating zone due to its annual rainfall of 1352mm and climatic conditions, covering a rainfed area of 371.3 ('000 ha) with paddy and pulses being major crops while maize and millets are cultivated on roughly 11 per cent of this land.

This paper has covered four blocks in Kalahandi district of Odisha, India, viz., Bhawanipatna, Junagarh, Narla, and Golanunda (Figure 1). This district was selected for the study as it had higher and better performing Farmer Producers Companies (FPCs). Narla, Bhawanipatna, Junagarh, and Golanunda are the four separate blocks where the four FPOs are located.

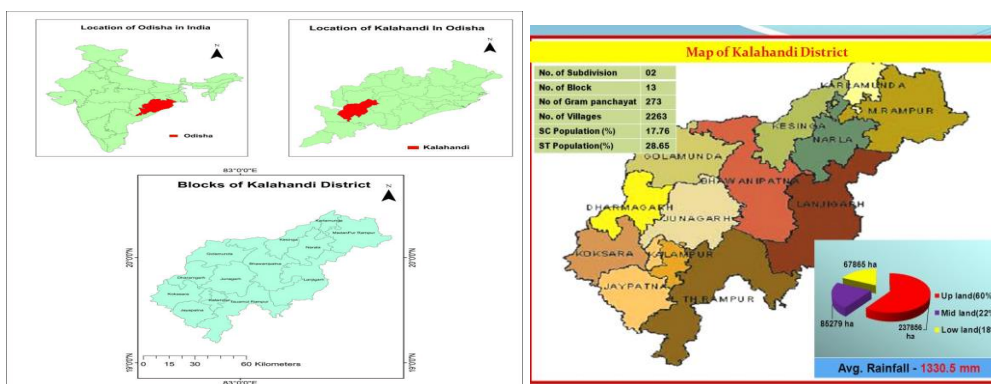


Figure 1: Map of the Study Area

Data Source, Sampling and Data Collection Technique

Kalahandi district was selected as it had higher and better performing Farmer Producers Companies (FPCs). The district has 24 FPCs, of which 11 were old (registered and performing since 2015) and 13 newly registered FPCs (registered during and after 2020). Out of 11 old FPCs, all the four functional FPCs with millet based enterprises were selected for the study. These four FPCs were located in four different blocks, i.e., Narla, Bhawanipatna, Junagarh, and Golanunda. A representative sample size has been taken by considering the confidence level (95) and confidence interval (4) of getting the sample frame from the facilitating and nodal agency. Accordingly, a sample size of 312 was considered for the study using multi stage sampling. The study was carried out in 2021–2022 among the households with FPC membership.

Structured interview schedule was used as the primary data collection techniques. The interview schedule included both open and close ended questions. In-depth interviews were also conducted with key informants such as the professionals

from the promoting organisation, the district officer from National Bank for Agriculture and Rural Development, and the officers from department of agriculture and horticulture. To empirically validate the objectives, the study use LOGIT model to answer the research questions and linear structural relation (one factor measurement model) to generate the latent variable score.

V

RESULTS AND DISCUSSION

Sustainability as a latent variable is symbolised as ζ , with selected four indicators for measuring the provision for increased income of farmers. They are innovation at farm level, risk coverage, value addition to the existing and surplus produces and collaborations for output linkages and marketing denoted by X_1, X_2, X_3, X_4 . The χ observable variable stands for measurement of ζ (Latent variable). The observable variable depends upon the latent variable, in which the coefficients are the magnitude of the expected change in the observed variable for a change in latent. The coefficient are denoted by λ_i ($i= 1, 2, \dots, 4$). The relationship between the observed variable and latent is caused by certain disturbance variable, which are denoted as δ_i ($i= 1, 2, \dots, 4$). Equation:

$$\chi = \Lambda_x \zeta + \delta \quad \dots(1)$$

Where

$$\chi = \begin{bmatrix} x1 \\ x2 \\ x3 \\ x4 \end{bmatrix}, \quad \Lambda_x = \begin{bmatrix} \lambda1 \\ \lambda2 \\ \lambda3 \\ \lambda4 \end{bmatrix}, \quad \zeta = [\zeta1], \quad \delta = \begin{bmatrix} \delta1 \\ \delta2 \\ \delta3 \\ \delta4 \end{bmatrix} \quad \dots (2)$$

The result estimation of one factor measurement model, the coefficient of observed variable innovation has been fixed to 1 in order to fix the measurement scale of the latent variable (sustainability). The result of coefficient (Table 1 and Figure 2) shows that innovation and value addition are the main determinants for enhancement/improvement in farmers' income alongside risk coverage and collaboration. The Goodness of fit index is 0.896 (Table 2), the model fits the estimations. The R2 (Table 1), value for innovation (0.797) and value addition (0.883) are high where as for other two variables values are low, which implies the improvement in model with certain more sets of observed variables. It is evident that government through various initiatives such as procurement of millets, mainstreaming millets value added products through self-help groups. Further, within

TABLE1: RESULT ESTIMATION OF LISREL (ONE FACTOR MEASUREMENT MODEL)

Latent Variable (1)	Observed Variable (2)	Coefficient (3)	Standard error (4)	t-value (5)	R2 (6)
Sustainability	Innovation	1.111	-	-	0.797
	Risk coverage	0.352	3.378	0.106	0.103
	Value addition	0.476	4.617	0.104	0.883
	Collaboration	0.427	1.73	0.237	0.540

Source: Field survey 2021-22.

the sample households the extent of adaptation of new technology, practices such as line sowing, transplantation and system of millet intensification (SMI) were found to be profoundly high. It is followed by better post-harvest management practices.

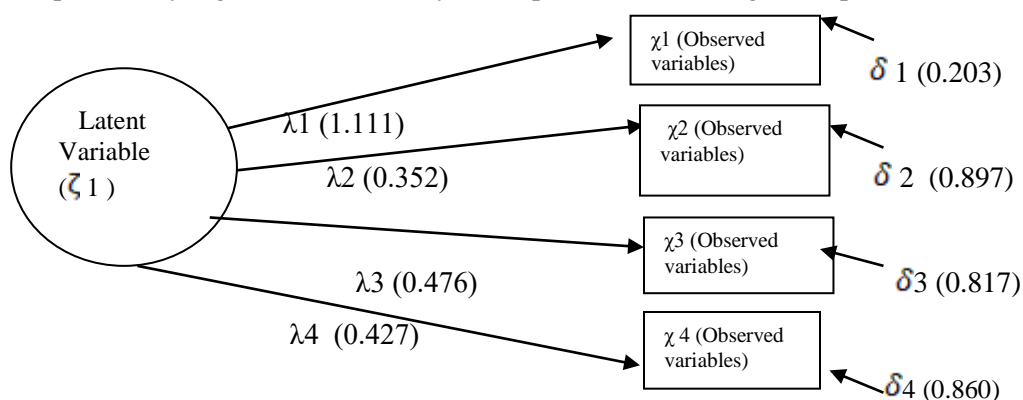


Figure 2: Path Diagram with Single Latent Variable and Observed Variables

For an sustainable production (Lusk, 2017) and meeting economic sustainability innovation is an important drivers leading to productivity growth (OECD, 2013). Although innovation is a complex process but plays an important role in growth (van Galen and Poppe, 2013) of a sector focusing on profitability, productivity and market orientation (Doris and Fiona, 2019).

Involvement with processed and value added products from millets such as laddoo, mixture, raw powder, snacks, vending trucks significantly gives an enhanced income to the farmers within the enterprise. Value addition significantly contributes towards transformation, raising farmers' income leading to agricultural growth (Dev, 2012).

The extent of collaboration among the various partners needs to better strengthen up to ensure a higher value. Collaboration with private partners, modern retail units for buy back arrangement could ensure a higher significant value.

TABLE 2: RESULT ESTIMATION OF REGRESSION MODEL

Variables (1)	Coefficient (2)	Standard error (3)	t-statistics (4)	R2 (5)
Age	-0.196*	0.0418	-4.323	
Education	-0.0160	0.120	-0.135	
Marital status	3.230*	2.149	1.518	
Children	0.190	0.254	0.723	
Experience in agriculture	-0.234	1.471	-0.168	
Scale of Operations	1.619*	0.798	2.180	
Financial Stability	0.636*	0.773	0.855	0.896
Family Support	6.389*	1.125	5.690	
Extension	-2.695	2.320	-1.160	
Policy /Govt	1.681*	1.054	1.579	
Public Relations	1.835*	1.086	1.652	
Fate & Belief	0.122	0.921	0.112	
Sustainability	0.171	0.052	-3.155	

Source: Field survey 2021-22; * Significant at 0.05 level.

From the above analysis (Table 2), age was found to be significant but farmer's interest towards entrepreneurship decreases with age due to negative coefficient. Studies (Brown *et al.*, 2005; Paulson and Townsend, 2005) has established the significant relationship between age and inclination towards entrepreneurship. Other variables like public relation, family support, marital status, policy governance, scale of operation are significant for a farmer's willingness to undertake millet based enterprises within the farmer producers company.

Marital status is found to be statistically significant which signifies that a farmer's probability to undertake the millet based enterprise is higher. Their need for taking care of the family and social responsibilities in a better way drives their decision to undertake the millet based enterprise. Family support is also highly significant as the need of their support and cooperation during production and post-production cycle.

Scale of operation is one of the most important factors. Economies of scale depend upon the scope of scale of operation of the enterprises, which ultimately determines the break-even of the business. The farmer at household level need to estimate the quantum of produce he contributes through aggregation to make the business sustainable.

Policy governance and public relations are external forces which support the farmers, farm enterprise from external stress, provide legal support, nurture and develop capacity of members, incentives Producers Company through various schemes, provision, bank linkage programs, arrange private vendors and traders to buy the produces and products. Odisha Millet Mission (OMM), National Bank for Agricultural and Rural Development (NABARD), Small Farmers Agribusiness Consortium (SFAC), facilitating agency and private traders supports the millet based enterprise in scaling up their business through financial and non-financial arrangements. Initiatives and program outline of Odisha Millet Mission have supported the farmers across the production and post-production system. Setting up of community seed centres with participatory varietal trails, improving agronomic practices in millets for improving the productivity through system of millets intensification (SMI), line transplantation and sowing are the major initiatives to strengthen the production system by the department of agriculture and farmers' empowerment under OMM.

Post-production initiatives like setting up of decentralise processing unit, supporting the FPOs/FPCs in setting up of enterprises, setting up of Mission Shakti café, consumption campaign in village, panchayats, districts and state level with the support of self-help group, Farmer Producers Company focusing on market linkages and value addition and inclusiveness of millets in Integrated child development schemes, mid-day meal and public distribution system were supported. The collaboration and linkages across the verticals have created a tangible and significant impact on the stability and sustainability of millet based enterprises in the context.

Policy and public relations can be generalized to other contexts being external factors for the institution building.

VI

CONCLUSION

Millet based enterprises among the members of the Farmer Producers Company in Kalahandi is an effort to accelerate and transform their collective strength for economic realisation. The millet based enterprise constitutes the provision of presently evolved FPC. The success among the producers' companies in any geographical contexts is very negligible. But there are few provisions among these new economic enterprises which ensure sustainability with their business operations. The main objective of this paper was to determine the important sustainability factors that create an impact on the farmers' income. Innovation and value addition gives an enhanced income to the enterprise. Even innovation and value addition increases the cost but on the other hand the value added products ensure higher income to the farmers. The provisional policy may be designed as like it benefit farmers, motivates them to pursue to set enterprises. Millets "*the super food*", which is under the state of international importance has got huge potentials to fit the socio-economic-ecological and health basket of the producers and consumer at regional, national and international market. Regular skill training and market driven techniques could act driving force for marginal and small farmers to overcome from poverty and low income group. The connectivity can be made by tapping taste and preference of conventional urban market as well as rural market by integrating and unleashing demands. Odisha Millet Mission (OMM) initiatives with response to diffusion of innovation, technology, good agriculture practices, supporting infrastructure, incentivising farmers is a driving force to unleash the potential of millets in terms of its enhancing production, productivity, coping with climatic conditions, standing resilient to climatic shocks, enhancing farmers income, promoting FPOs and SHGs for processing and marketing and improving nutritional security.

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